Burt-Utley and Utley. 2012. New species and notes on *Begonia* (Begoniaceae) from Mexico and Central America. Phytoneuron 2012-74: 1–25. Published 13 Aug 2012. ISSN 2153 733X

NEW SPECIES AND NOTES ON *BEGONIA* (BEGONIACEAE) FROM MÉXICO AND CENTRAL AMERICA

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ABSTRACT

Ten new species of **Begonia** are described, discussed, and illustrated: **Begonia wilburi** Burt-Utley & Utley, **Begonia gentryi** Burt-Utley & Utley, **Begonia liesneri** Burt-Utley & Utley, **Begonia mcphersonii** Burt-Utley & Utley, **Begonia pseudopeltata** Burt-Utley & Utley, **Begonia aguabuenensis** Burt-Utley & Utley, **Begonia sukutensis** Burt-Utley & Utley, **Begonia panamensis** Burt-Utley & Utley, **Begonia gracilioides** Burt-Utley & Utley, and **Begonia tenuis** Burt-Utley & Utley. *Begonia militaris* L.B. Sm. & B.G. Schub. is evaluated and *B. sciadophora* L.B. Sm. & B.G. Schub. is synonymized with it, while *B. pustulata* Liebm. and *B. ludicra* A. DC. are recognized as species endemic to México.

KEY WORDS: Begoniaceae, *Begonia*, México, Central America, Colombia

Continuing research with the Begoniaceae and preparation of the Begoniaceae for the Flora Mesoamericana has resulted in the recognition of a number of new species (Burt-Utley & Utley 1999; 2011), including the 10 that are described herein. One of these species, *B. wilburi*, is unique in Central America because of its potential dioecy and is only one of two species in the Flora with turbinate capsules. The other known obligate dioecious species in México and Central America are from México, *B. extranea* L.B. Sm. & B.G. Schub. (Guerrero, México, Michoacán, and Jalisco), and *B. nemoralis* L.B. Sm. & B.G. Schub. (Michoacán), both of which are tuberous. Another tuberous species from México and Central America, *B. biserrata* Lindl., is either monoecious or dioecious (Burt-Utley & McVaugh 2001). Two other species also stand apart from other *Begonia* in Chiapas and Central America, *B. gracilioides* and *B. tenuis*, because they are tuberous and also produce bulbils in their leaf axils that can then develop into new individuals. In Central America, similar bulbils have been observed only on *B. weberlingii* Irmsch. and *B. ignea* (Kl.) A. DC. In contrast, in México, 17 of the 37 known tuberous taxa are known to produce bulbils and are most common in central and western México (Burt-Utley, pers. obs.). The species described represent diverse phenetic groups including sect. *Casparya* (Kl.) A. DC., sect. *Gireoudia* (Kl.) A. DC., sect. *Weilbachia* (Kl. & Oerst.) A. DC., and sect. *Knesebeckia* (Kl.) A. DC.

1. **BEGONIA WILBURI** Burt-Utley and Utley, sp. nov. **TYPE. COSTA RICA. San José.** Ca 26 km S of La Georgina on Interamerican Hwy to San Isidro de El General, 1600–1800 m, 19 Oct 1974, *J. Utley & K. Utley 1470* ♂ (holotype: DUKE; isotypes: CR, USF). Figure 1.

Suffrutescent herbs to at least 1.5 m, frequently branching, potentially dioecious, upper internodes slender, 3.5–7.5 cm, 1.5–4.5(–6) mm diam, densely hirtellous to tomentose with short ferrugineous villi to 0.4 mm. **Stipules** persistent to deciduous, asymmetric, unequal, the larger appearing hemi-ovate to hemi-orbicular with an oblique acute apex, 4–5.5 x 8–11 mm, the smaller, oblong to triangular, 1.2–8 x 1–4 mm, apically acute, marginally ciliate and denticulate to serrulate, hirtellous above and beneath with villi to 0.3 mm; petioles 0.7–5.4 cm, densely hirtellous with villi to 0.5 mm; leaf blades oblique or rarely straight, asymmetrically elliptic to oblong, (5.5–)8.5–18+ x

(3.6–)4.8–8.1 cm, basally unequal-sided, apically attenuate-acuminate, marginally doubly ciliate-crenate to doubly ciliate-serrate and serrulate, above and below densely hirtellous; (6–)11 to 14 pinnately nerved on the broad side of the blade. **Staminate inflorescences** appearing subumbelliferous with perhaps occasionally than 2 branches at the lowermost node, 3–10 or more-flowered; peduncles 1–6.7 cm, densely hirtellous with villi to 1 mm; bracts deciduous, elliptic, to 6.5–11 x 3.5–5.5 mm, marginally ciliate-serrulate to ciliate-laciniate. **Pistillate inflorescences** 1-flowered; peduncles (1.5–)3.5–4.5 cm, densely hirtellous with villi to 1 mm; bracts minute, 1–4 mm, apically lobed. **Staminate flowers** with pedicels 6–13 mm, hirtellous; sepals 2, elliptic to ovate, 8.5–13 x 8–10 mm, marginally occasionally ciliate distally, glabrous to pilose, translucent white to white suffused pink; petals 2, narrowly obovate, 7.5–8.5 x 3.5–5.5 mm, translucent white or white mottled pink; stamens 40–59, appearing monadelphous; filaments 1–1.5 mm; anthers narrowly oblong to obovate, 1.5–2 x 0.4–0.6(–0.8) mm. **Pistillate flowers** with pedicels 1–4 mm, densely hirtellous; bracteoles wanting; tepals 5, subequal, ovate, 12.5–15 x 4–10 mm, pilose without, white or white suffused pink; ovaries trilocular with bipartite placentae, 11 mm, densely hirtellous; styles multi-branched to 2 mm; stigmas at tips of stylar branches. **Capsules** with pedicels (5–)8–14 mm; bodies turbinate, unbeaked, 15–20 mm; wings or horns 3, subequal, oblong to obovate, marginally entire to undulate or denticulate distally.

Etymology. It is a great pleasure to name this distinctive species in honor of Dr. Robert L. Wilbur at Duke University who collected extensively in Costa Rica and Panama and has been particularly dedicated to their montane floras. Dr. Wilbur devoted much of his career to developing the fine vascular plant collection in the Duke Herbarium. He was a fine dissertation advisor and mentor for my research with Begoniaceae.

Distribution and habitat. *Begonia wilburi* occurs at elevations between 1600 m and 3350 m in montane cloud forests and wet secondary forests on steep mountainsides in the Cordillera Talamancas with *Almus* and other vegetation in Costa Rica and western Panama.

Begonia wilburi is characterized by its apparent dioecy and 1-flowered pistillate inflorescences, immediately standing apart from other known Mesoamerican taxa, except occasionally *B. biserrata* in its dioecy (Burt-Utley & McVaugh 2001). While it is unclear if *B. wilburi* is dioecious, branches of specimens examined either had only staminate inflorescences or pistillate inflorescences at each node, and no branches had both staminate and pistillate inflorescences. In all species studied from México and Central America, only the tuberous *B. cebadillensis* Houghton ex L.B. Sm. & B.G. Schub. was observed with separate staminate and pistillate inflorescences on the same stem or on the same individual (Burt-Utley pers. obs.). Although there are a number of collections of *B. wilburi*, only two examined (*Picado & Gamboa 251*, MO; *Utley & Burt-Utley 9033, USF*) consist of a branch with staminate inflorescence and a branch with pistillate material, and it is unclear if they came from the same individual. It is not surprising that only two collections of *B. wilburi* have both staminate and pistillate material because staminate stems or individuals of this species are inconspicuous when flowering, and this is even more true of pistillate stems with their short peduncles with one flower (Burt-Utley pers. obs.).

Begonia wilburi was first collected by Adolph Tonduz in April 1898 ("Herb. Instit. physico-geogr. nat. costaricensis" #12274) and subsequently annotated by C. de Candolle as *B. cooperi* C. DC., a vegetatively similar species. *Begonia wilburi*, however, appears dioecious with "horned" or turbinate capsules and ovaries, an unusual character that immediately places it in the predominantly South American section *Casparya* (Kl.) Warb. Within Central America, the remaining *Begonia* species have ovaries, capsules, or rarely berries with wings and are all monoecious (pers. obs.). The only other species in this section known from Costa Rica and Panama is *B. urticae* L. f. and *B. wilburi* is easily separated from it by vegetative and floral characters, including its larger leaf blades

Figure 1. *Begonia wilburi*. Isotype (*Utley & Utley 1470*, USF).

[(5.5–)8.5–18 x (3.6–)4.8–8 cm vs. 0.9–7.5 x 0.5–3 cm], its dioecy, larger staminate sepals (8.5–13 x 8–10 mm vs. 3–5 x 3–4 mm), more numerous stamens (40–59 vs. 5–16), and unbeaked ovaries and capsules.

Begonia wilburi appears most closely related to the Colombian endemic, *B. ursina* L.B. Sm. & B.G. Schub., described from fragments, which also is presumably dioecious, with similar few-flowered male inflorescences and one-flowered female inflorescences on separate stems. Moreover, both species are reported from a high elevations (3100 m) and have hirsute to hirtellous stems, leaves, sepals, petals, tepals, and ovaries (pers. obs.; L.B. Sm. & B.G. Schub. 1946). Leaf blades of *B. wilburi* are larger than those of *B. ursina* [(5.5–)8.5–18+ x (3.6–)4.8–8.1 cm vs. 5–5.7 x 1.6–2.4 cm]. Stipules also differ in form between these two species, with those of *B. wilburi* having two different shapes at each node (the larger hemiorbicular and the smaller oblong to triangular) while those of *B. ursina* are ovate. Bracts are large and elliptic in staminate inflorescences (6.5–11 x 3.5–5.5 mm) of *B. wilburi* but much smaller to minute (1–4 mm) in their pistillate inflorescences. In *B. ursina,* staminate bracts are described as ovate (10 mm), and apparently are equal in size to the "bracteoles" of its pistillate flowers. It seems very likely that the authors actually were describing the pistillate bracts of *B. ursina* rather than bracteoles. *Begonia wilburi* is also distinguished from *B. ursina* in its subequal 5-tepaled pistillate flowers, in contrast to the 6-tepaled pistillate flowers of *B. ursina* with three subequal outer tepals and three smaller inner subequal tepals. Six-tepaled pistillate flowers are not unique to *B. ursina* and have been observed in other species in sect. *Casparya* (L.B. Sm. & B.G. Schub. 1946). While both species have unbeaked capsules, the horns of *B. wilburi* are straight, broad, and oblong to obovate, in contrast to those of *B. ursina* which are narrow and falcate.

Specimens examined. **COSTA RICA. San José.** Bords du Río de la Mala, Via au Copey, Apr 1898, *Tonduz 12274* ♂ (CR); Cantón Perez Zeledon, P.N. Chirripó, cordillera de Talamanca, sendero al Mirador, 9°33'20' N, 83°40'15" W, 18 Aug 1995, *Picado & Gamboa 251* (♂ & ♀ MO, ♂ USF); Cantón Perez Zeledon, 1 km de Division a la par de Carr. Interamericana, 9 Dec 1996, *Hammel & Hodel 20575* (MO); slopes of Cordillera de Talamanca near la Division, N of San Isidro de El General, 6 Feb 1963, *Williams, Jiménez M., & Williams 24385* ♂ (F). 10.8 km S of La Georgina on Interamerican Hwy to San Isidro, 25 Jun 1995, 8000 ft, *Utley & Utley 9031* ♂ (USF); 9.8 km S of La Georgina, 25 Jun 1995, 8000 ft, *Utley & Utley 9033* (♂ MO, US, ♂ & ♀ USF). **Puntarenas.** N of San Isidro del General, 12 Aug 1971, 7000–11000 ft, *Vaughan, Dwyer, Spellman, & Wunderlin 679* ♂ (MO). **PANAMA. Chiriquí.** Vic. of Cerro Punta, 0.5 mi SE of Entre Ríos, 1 mi by rd from town of Cerro Punta, 25 Nov 1979, 2000 m, *Croat 48573* ♀ (MO); Volcán Barú (E slope), deep draw W of Finca Yen, 17 Mar 1979, 8000 ft, *Hammel, D'Arcy, & Averett 6452* (MO).

2. BEGONIA GENTRYI Burt-Utley & Utley, sp. nov. **TYPE. COLOMBIA. Chocó.** Alto de Buey, 500–1200 m, 8 Jan 1973, *A. Gentry & E. Forero 7262* (holotype MO; isotypes MO, US). Figure 2.

Rhizomatous herbs; internodes very short, to 9 mm, 7–9.5 mm diam, glandular and villous-squamose with trichomes 2–4(–6) mm. **Stipules** apparently persistent, narrowly triangular, 13–21 x 3–9 mm, marginally entire, villous, strongly keeled, with the keel fimbriate-laciniate; petioles 9–21 cm, villous with stout trichomes 2–5 mm intermixed with minute glandular hairs; leaf blades asymmetric, oblique to transversely elliptic, reniform or ovate, 12–28 x 8.5–19 cm, basally cordate, apically acute to short acuminate, marginally eciliate and somewhat undulate, glabrous to minutely glandular above and glandular to very sparingly villous below, especially on nerves, with trichomes 0.3–2 mm; 10–12-palmatinerved. **Inflorescences** asymmetrically cymose, greatly exceeding the foliage, ca 14-flowered; peduncles 40–70 cm, sparingly villous with trichomes 1.5–6 mm; bracts caducous, oblong-elliptic, 20 x 11–12 mm, apically truncate, marginally entire. **Staminate flowers** with pedicels (11–)15–20 mm, glabrous; sepals 2, suborbicular to broadly oblong, 11–14 x 13–14 mm, glabrous, light orange; petals 2, obovate, 10–12 x 7 mm; stamens 25–32; filaments appearing free, less than 0.1 mm; anthers elliptic to obovate, 2–2.2 x 0.4–0.6 mm. **Pistillate flowers** with pedicels 12–13 mm, glabrous; bracteoles wanting; sepals 2, transversely elliptic, 11–15 x 10–14 mm, glabrous, light orange; petals 2, obovate, 10 x 8 mm; ovary trilocular with bipartite placentae, 6–6.5

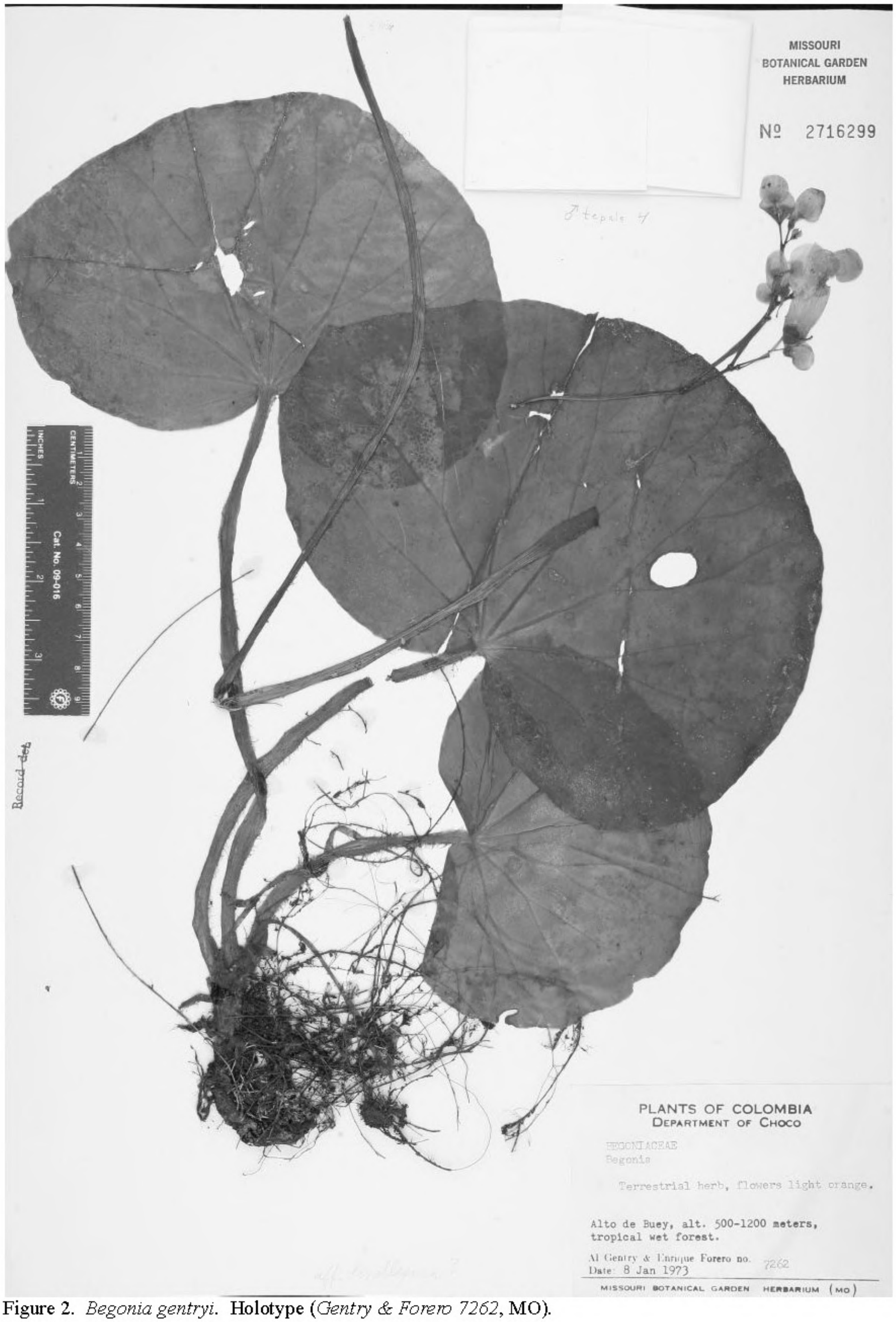

Figure 2. *Begonia gentryi*. **Holotype** (*Gentry & Forero 7262*, MO).

mm, glabrous to sparingly glandular; styles 1.7–2 mm, free to the base; stigmas bicornute. **Capsules** with pedicels 19–27 mm; bodies 9–11 mm; locule chambers externally appearing broadly ovate, 7.5–8.5 x 6.5–8 mm; wings 3, unequal, the largest wing ovate to elliptic, 19–23 x (9–)13–18 mm, apically rounded to subacute, the other 2 marginiform and triangular to lunate.

Etymology. *Begonia gentryi* is named in honor of the late Dr. Alwyn H. Gentry (1945–1993), who was a Curator at the Missouri Botanical Garden before his untimely death in an airplane crash in Ecuador.

Distribution and habitat. *Begonia gentryi* is known from the Chocó in Colombia in tropical wet forests at elevations between 500 and 1200 m and has been collected in the Darién in Panama. According to Whiteford and Eddy, *B. gentryi* is common above 900 m in the Serrania de Jungorodo in Panama.

Begonia gentryi is distinguished by its rhizomatous habit, eciliate leaf margins, and pistillate flowers with two sepals and two petals. It is one of about four rhizomatous species occurring in Colombia and is readily distinguished from them by its staminate and pistillate flowers consistently with two sepals and two petals, in contrast to two of the remaining three species that have apetalous flowers (*B. nelumbiifolia* Schlecht. & Cham. and *B. urophylla* Hook.) and *B. sericoneura* Liebm. with apetalous staminate flowers but pistillate flowers that are either apetalous or have a single petal (Burt-Utley 1985). *Begonia gentryi* stands apart from known Mesoamerican rhizomatous taxa in its orange pistillate and staminate flowers and, with the exception of *B. mucronistipula* C. DC., pistillate flowers with two sepals and two petals. Flowers of species from the region of the Flora characteristically have sepals, petals, or tepals that range from white to deep pink or rarely yellow-green (Burt-Utley, pers. obs.). *Begonia gentryi* is also notable for the small but conspicuous cystospheres, which are evident on all plant parts except the petals and roots. It appears most closely related to the Panamanian endemic, *B. mucronistipula*, with which it shares its rhizomatous habit and similar pistillate flowers (Burt-Utley & Utley 2011). Other rhizomatous Central American taxa have pistillate flowers that are apetalous or have one petal or five subequal tepals. *Begonia gentryi* is readily distinguished from *B. mucronistipula* by a number of characters, including its internodes with a villous-squamose indument (vs. glabrous), villous stipules and petioles (vs. glabrous), larger anthers (2–2.5 mm vs. 1–1. 6 mm), and its large primary wings [19–23 x (9–)13–18 mm vs. (11–)15–17 x 7–9.5 mm]. *Begonia gentryi* also occurs in tropical wet forests at a lower elevations than those reported for the montane *B. mucronostipula* (500–1200 m vs. 1500–2100 m). Although *B. gentryi* shares characters with *B. mucronostipula*, which was tentatively included in sect. *Gireoudia* (Doorenbos et al. 1998), the sectional affiliations of both species are unclear (pers. obs.).

Additional specimens examined. PANAMA. Darién. Serrania de Jungorodo, Mamey, 900 m, 10 Mar 1982, *Whiteford & Eddy 460* (BM). **COLOMBIA. Chocó.** S ridge of Cerro Mecana, 6°16'N, 77°18'W, 500–700 m 7 Jan 1984, *Juncosa 1758* (MO, USF); Río Mutatá ca 3 km above its junction with Río El Valle NW of Alto de Buey, 850 m, 7 Feb 1971, *Lellinger & de la Sota 182* (US).

3. **BEGONIA LIESNERI** Burt-Utley & Utley, sp. nov. **TYPE. COSTA RICA. Cartago.** Cerro Doán, 3 km E of Cachí, 23 Apr 1969, *R.W. Lent 1601* (holotype: F; isotypes: NY, US). Figure 3.

Suffrutescent herbs to 80 cm tall; upper internodes (1.5–)4–6 cm, 2–4 mm diam, glabrous, cystospheres abundant. **Stipules** deciduous, asymmetrically ovate to oblong-ovate, 15–18 x 7–8 mm, marginally entire, glabrous, keeled, with only the keel villous; petioles 1.5–3.5 cm, glabrous to very sparingly villous, with the stout villi 0.1–0.7 mm; leaf blades straight to weakly arcuate, asymmetrically narrowly elliptic to ovate, 7–13 x 1.8–4.3 cm, basally unequally sided, apically

attenuate-acuminate, marginally ciliate-serrulate and ciliate-serrate, glabrous throughout above, villous beneath only on principal nerves with stout villi to 0.7 mm; (10–)12–15 pinnately nerved on the broad side of the blade. **Inflorescences** shorter than the leaves, laxly cymose, ca +/- 7-flowered; peduncles 3.5–6.5 cm, glabrous to villous with few villi to 0.7 mm; bracts deciduous, ovate to obovate, 9–12 x 5–7 mm, marginally serrulate, glabrous to sparingly villous, keeled, or the keel only villous. **Staminate flowers** with pedicels 10–15 mm, sparingly short villous; sepals 2, ovate to oblong or elliptic, 9–16 x 6–9.5 mm, glabrous to glandular and sparingly short villous; petals 2, obovate, 9–13.5 x 4.5–6.5 mm, distally shallowly lobed, glabrous; stamens +/- 23, appearing somewhat monadelphous; filaments 0.8–1.3 mm; anthers narrowly obovate to elliptic, 1.8–2 x 0.5–0.7 mm. **Pistillate flowers** with pedicels to 15 mm, villous; bracteoles present, deciduous, obovate, 8–9 x 6–7 mm, apically ciliate-laciniate, marginally ciliate-serrulate, sparingly villous; sepals at anthesis unknown; petals/tepals unknown; ovary trilocular with bipartite placentae, 8–10 mm, hirtellous and minutely glandular; styles and stigmas unknown. **Capsules** with pedicels to 24 mm; bodies 11–14 mm; externally locule chambers elliptic, 8–11 x 6–7 mm; wings subequal to unequal, the largest one asymmetrically triangular, 5–12 x 11–15 mm, the others asymmetrically triangular.

Etymology. *Begonia liesneri* is named in honor of Mr. Ronald Liesner at the Missouri Botanical Garden. who first recognized this as a new species.

Distribution and habitat. *Begonia liesneri* is known only from Cartago Province where it occurs in cloud forests or rainforests at bases of cliffs between 1400 and 1450 m.

Begonia liesneri is characterized by a suite of characters including its suffrutescent habit, glabrous internodes, pinnately nerved leaf blades, large bracteoles, ca 7-flowered inflorescences, and large capsules with subequal to unequal capsule wings. With its several-flowered inflorescences that are shorter than the foliage, *B. liesneri* is potentially an inconspicuous component of the vegetation and easily overlooked by collectors. Without pistillate flowers available, it is difficult to determine the relationships of *B. liesneri* with other Central American taxa because caulescent species with similar staminate flowers could have pistillate flowers with two sepals and one or two petals or four to five subequal tepals (Burt-Utley, pers. obs.). *Begonia liesneri* is distinguished from suffrutescent, pinnately nerved *Begonia* species found in Costa Rica by its several-flowered inflorescences, large, marginally serrulate bracts, and, in all but *B. tonduzii* C. DC., its subequal capsule wings. With the exceptions of *B. tonduzii*, *B. wilburi* (described herein), and the Costa Rican endemic *B. cooperi* C. DC., it is the only other pinnately nerved, pubescent, suffrutescent taxon from Central America (pers. obs.). From *B. tonduzii* it is readily distinguished by its larger bracts [9–12 x 5–7 mm vs. 1.3–3(–5) x 1–3(–4) mm], larger staminate sepals (9–16 x 5–10.5 mm vs. 5–10.5 x 4.5–9 mm), and larger capsules (11–14 mm vs. 6–11 mm) (Burt-Utley, pers. obs.). It differs from *B. cooperi* C. DC. in its much larger staminate sepals [9–16 x 6–9.5 mm vs. (3–)4–6(–8) x 3.5–5(–8) mm], large, conspicuously bracteolate pistillate flowers (vs. ebracteolate), persistent petals, and larger capsules [11–14 mm vs. (4–)6–8.5 (–9.5) mm] (Burt-Utley, pers. obs.). The only other pinnately nerved suffrutescent species bearing several flowers is *B. wilburi*, but *B. liesneri* differs immediately from this potentially dioecious species in its monoecy and non-turbinate capsules.

Additional specimens examined. COSTA RICA. Cartago. Tapantí, Orosi, 1400 m, 29 Jan 1983, *I. A. Chacón 259* (USF).

Figure 3. *Begonia liesneri*. Holotype (*Lent 1601*, F).

4. **BEGONIA MCPHERSONII** Burt-Utley & Utley, sp. nov. **TYPE. PANAMA. Bocas del Toro.** Vic. of Cerro Colorado mine above San Felix, trails N of road on continental divide, 8°35'N, 81°50'W, 1500 m, 26 Jan 1988, *G. McPherson 12019* (holotype: MO; isotypes: PMA, USF). Figure 4.

Rhizomatous herbs; internodes 0.5–1.6 cm, 0.4–1.3 cm diam, lanate with fine sericeous trichomes 1.5–5 mm. **Stipules** persistent, coriaceous, asymmetrically ovate, 1.2–2.7 x 1–1.1+ cm, marginally entire, glabrous keeled, or the keel only pilose, cystospheres abundant; petioles (10.5–)13–23 cm, tomentose with fine sericeous villi 1.5–4 mm; leaf blades oblique to transverse, symmetric to asymmetric, elliptic to oblong in outline, 10.5–18 x 8–17.5 cm, basally cordate, apically with no distinct apex, marginally ciliate-serrate and ciliate-serrulate, deeply asymmetrically palmately lobed usually with 4 to 5 major attenuate-acuminate lobes to ½ the blade length, sparingly pilose above especially above the petiole-blade junction, lanate on primary nerves below but pubescence less dense in intercostal regions; 10–11-palmatinerved. **Inflorescences** greatly exceeding the foliage, weakly asymmetric, densely to laxly cymose with elongate branches, many-flowered; peduncles (21–)30–49 cm, lanate to pilose; bracts caducous, the lowermost apparently completely encircling the inner in bud, subequal, broadly navicular, broadly ovate, 1.7 x 1.4 cm, pilose, cystospheres abundant. **Staminate flowers** with pedicels 9–10.5 mm, pilose; sepals ovate, 5–7 x 7–9 mm, pilose, pink-white; petals 0–2, narrowly obovate to ovate, 4.5–6 x 1.2–1.5 mm; stamens 23–35; filaments 0.5–0.8 mm, on a raised torus and appearing somewhat monadelphous; anthers obovate to elliptic, 1–1.4 x 0.4–0.5 mm. Pistillate flowers with pedicels 6–8 mm, pilose; bracteoles wanting; sepals suborbicular to transversely broadly elliptic, (5.5–)8–9 x 8–9.5 mm, pilose, pink-white; petals 0–1, obovate, 6 x 2.5–3 mm; ovary trilocular with bipartite placentae, 3.5–4.5 mm, pilose, cystospheres present; styles 3, 1.5–2 mm, connate over ½ their length; stigmas bicornute. **Capsules** with pedicels 13–19 mm; bodies 6–7.5 mm with conspicuous cystospheres; locule chambers externally ovate, 5–6.5 x 3.5–5.5 mm; wings 3, unequal, the largest wing asymmetrically elliptic, 11–14.5 x 8–10.5 mm, the second one asymmetrically triangular, 5–7 x 5–6 mm and the third marginiform.

Etymology. It is a pleasure to name this species in honor of Dr. Gordon McPherson at the Missouri Botanical Garden, who collected this species. Gordon was our field companion and guide in Panama when we collected *Begonia* and Bromeliaceae in 1988.

Distribution. *Begonia mcphersonii* is known only from the provinces of Bocas del Toro and Chiriquí in Panama near the continental divide between (800–)1200–1500 m.

Begonia mcphersonii appears most similar and closely related to other two species in sect. *Gireoudia* (Kl.) A. DC., *B. involucrata* Liebm. and *B. broussonetiifolia* A. DC., because of its deeply lobed leaves, tomentose indument, and its lowermost bracts with the outer apparently encircling the inner. This latter character is unusual among Central American *Begonia* and has only been observed in the suffrutescent taxa in sect. *Gireoudia*, *B. involucrata* and *B. broussonetiifolia* A. DC. (Burt-Utley 1985). From *B. broussonetiifolia*, *B. mcphersonii* is readily distinguished by its rhizomatous habit, shorter and stouter internodes [0.5–1.6 cm, 0.4–1.3 cm diam vs. (0.9–)1.8–4.4 cm, (2–)3–6 mm diam], palmately multilobed blades (4–5 major lobes vs. 1–2 lobes), and longer peduncles [(21–)30–49 cm vs. (14.6–)17.5–27.5(–29) cm. *Begonia mcphersonii* stands apart from *B. involucrata* in a number of characters including its habit and elongate inflorescence internodes. Upper branches and frequently the lower branches of *B. involucrata* inflorescences are greatly reduced in length, resulting in inflorescences that are strongly congested distally (Burt-Utley 1985). Because of these differences in branch length, there are conspicuous differences in pedicel length between these two species. Pedicels of staminate flowers, pistillate flowers, and capsules of *B. mcphersonii* are much shorter than those of *B. involucrata* [♂: 9–10.5 mm vs. (9–)12–23 mm; ♀: 6–8 mm vs. (6–)16–25 mm(–30) mm; capsules: 13–19 mm vs. (15–)21–36(–60) mm].

Figure 4. *Begonia mcphersonii*. Holotype (*McPherson 12019*, MO).

Additional specimens examined. PANAMA. Chiriquí. Above San Felix on mining rd. 18–27 mi off the Pan Am Hwy above Chame or turnoff to Escopeta, 12 Mar 1976, *T. B. Croat 33075* (MO, USF); vic. of Cerro Colorado mine development, 28 mi above San Felix, 9–10 mi above turnoff to Escopeta, 13 Mar 1978, *Croat 33206* (MO); on rd in vic. of branch in rd. to Cerro Colorado and Escopeta, above Río San Felix ca 13 mi N of Río San Felix bridge, 15 Mar 1976, *Croat 33444* (MO).

5. BEGONIA PSEUDOPELTATA Burt-Utley & Utley, sp. nov. **TYPE. HONDURAS. Lempira.** Trail from old electricity generation plant to Camp Don Tómas ca. "10 straight line" WSW of Gracias, Parque Nacional Celaque, 14°33'N, 88°40'W, 1850 m, 11 Feb 1993, *R. Evans 1154* (holotype: MO; isotype: USF). Figure 5.

Suffrutescent herbs with branching stems to 1.5 m tall; upper internodes 1–2.9(–5.3) cm, 4–8 mm diam, sparingly to densely tomentose with uniseriate whiplash trichomes to 4 mm, intermixed with stout multiseriate whiplash trichomes to 8 mm. **Stipules** persistent, asymmetrically oblong to oblong-ovate, 12–14.5 x 7.5–12 mm, apically obtuse to truncate, marginally entire, glabrous to sparingly tomentose, weakly keeled distally with the keel excurrent apically; petioles (0.6–)2.5–9.5 cm, sparingly to densely tomentose with fine sericeous trichomes to 4 mm; leaf blades oblique, asymmetric, ovate to lance-ovate, 1.8–11.8 x 0.6–8.1 cm, basally peltate, apically acuminate to attenuate-acuminate, marginally ciliate-denticulate to ciliate-crenulate and undulate, occasionally dentate at ends of major nerves; sparingly hirsute above, becoming glabrate, sparingly to moderately tomentose below with trichomes most dense on major nerves; 7–9-peltinerved. **Inflorescences** shorter than to exceeding the leaves, symmetric to asymmetric, densely cymose, ca 40 or more-flowered; peduncles 3.8–14.3(–22.5) cm, sparingly to moderately tomentose; bracts deciduous, the lowermost oblong, 4–11 x 2–3 mm, apically ciliate-lacerate, marginally distally ciliate-lacerate, hirsute. **Staminate flowers** with pedicels 6–14 mm; sepals 2, obovate to elliptic, 7–10.5 x 3.5–6.5 mm, glabrous; petals 2, narrowly elliptic to oblanceolate, (4.5–)7.5–8.5 x 1.6–2.8 mm; stamens 7–13; filaments 0.8–2 mm, borne on a raised torus; anthers oblong to oblong-obovate, 1.1–1.7 x 0.6–0.9 mm. **Pistillate flowers** with pedicels (4.5–)9–11 mm; bracteoles wanting; sepals 2, obovate, 7–8 x 4–5.5 mm, glabrous; petals 1, oblanceolate, 5.5–7 x 1.5–2 mm; ovary trilocular with bipartite placentae, 5.5–7.5 mm, glabrous; styles 3, 2–2.5 mm, fused basally; stigmas lunate. **Capsules** with pedicels 11–18 mm; bodies 7–9 mm; locules externally appearing broadly elliptic to suborbicular, 4.5–6.5 x 4–7 mm; wings 3, subequal to somewhat unequal, the largest wing weakly asymmetric, broadly triangular to lunate-triangular, 5–6.5 x 5.5–8 mm, the second and third wings shallowly lunate to asymmetrically triangular.

Distribution and habitat. *Begonia pseudopeltata* is known from Guatemala, Honduras, and Nicaragua at elevations between 600 and 2000 m, where it has been collected in mixed pine and hardwood secondary growth.

Begonia pseudopeltata is an attractive suffrutescent species with abundant small flowers and capsules. It resembles *B. peltata* Otto & Dietr. in its peltate leaves and is potentially closely related to this taxon. Although *B. peltata* (syn. *B. incana* Lindl.) was included in sect. *Rachia* (Kl.) A. DC., this species was most recently placed in sect. *Gireoudia* (Doorenbos et al. 1998). *Begonia pseudopeltata* is readily distinguished from this latter taxon by its oblong to oblong-ovate stipules (vs. ovate to triangular) and floral characters, including its more narrow staminate sepals (3.5–6.5 mm vs. 7–11 mm), fewer stamens (7–13 vs. 14–27), longer styles (2–2.5 mm vs. 1.3–2 mm), smaller ovaries (5.5–7.5 mm vs. 6.5–12 mm), and smaller capsules (7–9 mm vs. 10.5–18 mm). Although these species share somewhat overlapping distributions, with both occurring in Guatemala and Honduras, *B. pseudopeltata* has not been reported from México and *B. peltata* is not known to occur in Nicaragua. Moreover, there is no evidence that these species have been collected from the same general localities in either Guatemala or Honduras.

Figure 5. *Begonia pseudopeltata.* Isotype (*Evans 1154,* USF).

Additional specimens examined. GUATEMALA. Chiquimula. Cerro Brujo, in vic. of Río Negro, below Montaña Montenegro, near village of Brujo, 1500–2000 m, 1 Nov 1939, *Steyermark 30937* (F). **HONDURAS. Copán.** ca Dulce Nombre, 1200 m, 30 Mar 1963, *Molina R. 11748* (F, LL, NY). **Lempira.** Sendero entre La Planta Eléctrica y las primera casa (abandonada) de Don Tómas Parque Nac. de Celaque, 14°36'N, 88°40'W, 18 Mar 1991, 1800 m, *House 892* (MO, USF); Cuyamel, without further locality, 30 Mar 1923, *Carleton 474* (US). **NICARAGUA. Jinotega.** Las Alturas de Kilambé, "Filas el Portal" NE del Cerro Kilambé, 13°37'N, 85°40'W, 600–900 m, 26 Mar 1981, *Moreno & Sandino 7594* (MO).

6. **BEGONIA AGUABUENENSIS** Burt-Utley & Utley, sp. nov. **TYPE: COSTA RICA. San José.** Cantón León Cortés, Z.P. Caraigres, Cuenca del Pirres-Damas, Cerro Caraigres, Falda SE Fila Aguabuena, entre Quebrada Pilas y Quebrada Ceniza, 9°42'45"N, 84°06'21"W, 1000-1200 m, 26 Dec 1996, *J.F. Morales 5945* (holotype: MO). Figure 6.

Rhizomatous herbs; internodes short and stout, 0.9–1 cm long, 1.3–1.8 cm diam, squamose with very broad lacerate and laciniate trichomes 3–5 mm. **Stipules** persistent, reflexed and revolute with age, asymmetrically ovate, 13–23 x 9–13 mm, marginally entire, glabrous, strongly keeled with the keel fimbriate; petioles 8.5–18.5+ cm, glabrous except for a ring of lacerate scales 4–5(–6.5) mm just beneath the petiole-blade junction; leaf blades ovate, 14–21 x 6.5–18 cm, apically attenuate-acuminate, basally peltate, marginally ciliate and weakly undulate, but denticulate at ends of major nerves, above glabrous to minutely glandular, below sparingly squamose on major nerves with trichomes 1.5–3 mm, 6–7-peltinerved. **Inflorescences** exceeding the foliage, asymmetrically cymose, many-flowered; bracts caducous, not seen; peduncles 22–59 cm, glabrous. **Staminate flowers** with pedicels 10–12 mm, glabrous; sepals obovate, 5.5–6.5 x 3.5–5.5 mm, glabrous, white-pink; petals wanting; stamens 7–11, borne on a raised torus; filaments 0.3–0.6 mm; anthers obovate, 1.1–1.3 x 0.5–0.7 mm. **Pistillate flowers** with pedicels 6–8 mm, glabrous; bracteoles wanting; sepals 7.5–10 x 5.5–8 mm, glabrous, white-pink; petals wanting; ovaries trilocular with bipartite placentae, 7–8 mm, glabrous; styles 3, 2–2.5 mm; stigmas lunate. **Capsules** with pedicels 8–11 mm; bodies 11-14 mm, locule chambers externally appearing obovate, 9 x 7 mm; wings subequal, the primary wing asymmetrically lunate-triangular, 5–7 x 9–11 mm; the other wings lunate, 4.5–6 x 8–9 mm.

Distribution and habitat. *Begonia aguabuenensis* is known only from central Costa Rica in San José province between 1000–1300 m.

Begonia aguabuenensis (sect. Gireoudia Kl. A. DC.) is distinguished by its stout rhizomes, peltate leaf blades, squamose petioles, apetalous staminate and pistillate flowers, and subequal ovary and capsule wings. It appears most similar to *Begonia manicata* var *peltata* L.B. Sm. & B.G. Schub. from Guatemala. Both taxa share similar rhizomatous habits, leaf blade size, peltate leaf blades, squamose petiolar trichomes, apetalous flowers, staminate sepals within the size observed for *B. manicata* var *peltata*, ebracteolate pistillate flowers, and similar capsule size and subequal capsule wings. The petiolar indument of both taxa is squamose, but that of *B. aguabuenensis* is restricted to a band just below the blade, while in *B. manicata* var *peltata* it is distributed throughout the petioles but is most dense just beneath the blade. *Begonia manicata var peltata* is known only from its type and one additional collection from Guatemala (Burt-Utley 1985). There are no known collections of *B. manicata* var *peltata* from Honduras or Nicaragua, while *B. aguabuenensis* appears restricted to Costa Rica. Ideally, more collections of *B. manicata* var *peltata* are needed before its synonymy with *Begonia aguabuenensis* is made.

Additional specimens examined. COSTA RICA. San José. Cantón de Acosta. Cuenca del Pirris-Damas, Fila Bustamante, Fila Aguabuena, Aserrí, entre Quebrada Chilamate y Quebrada Pilas, camino, 9°43'35" x 84°11'20"W, 1300 m, 12 Dec 1996, *Morales* 5921 (MO).

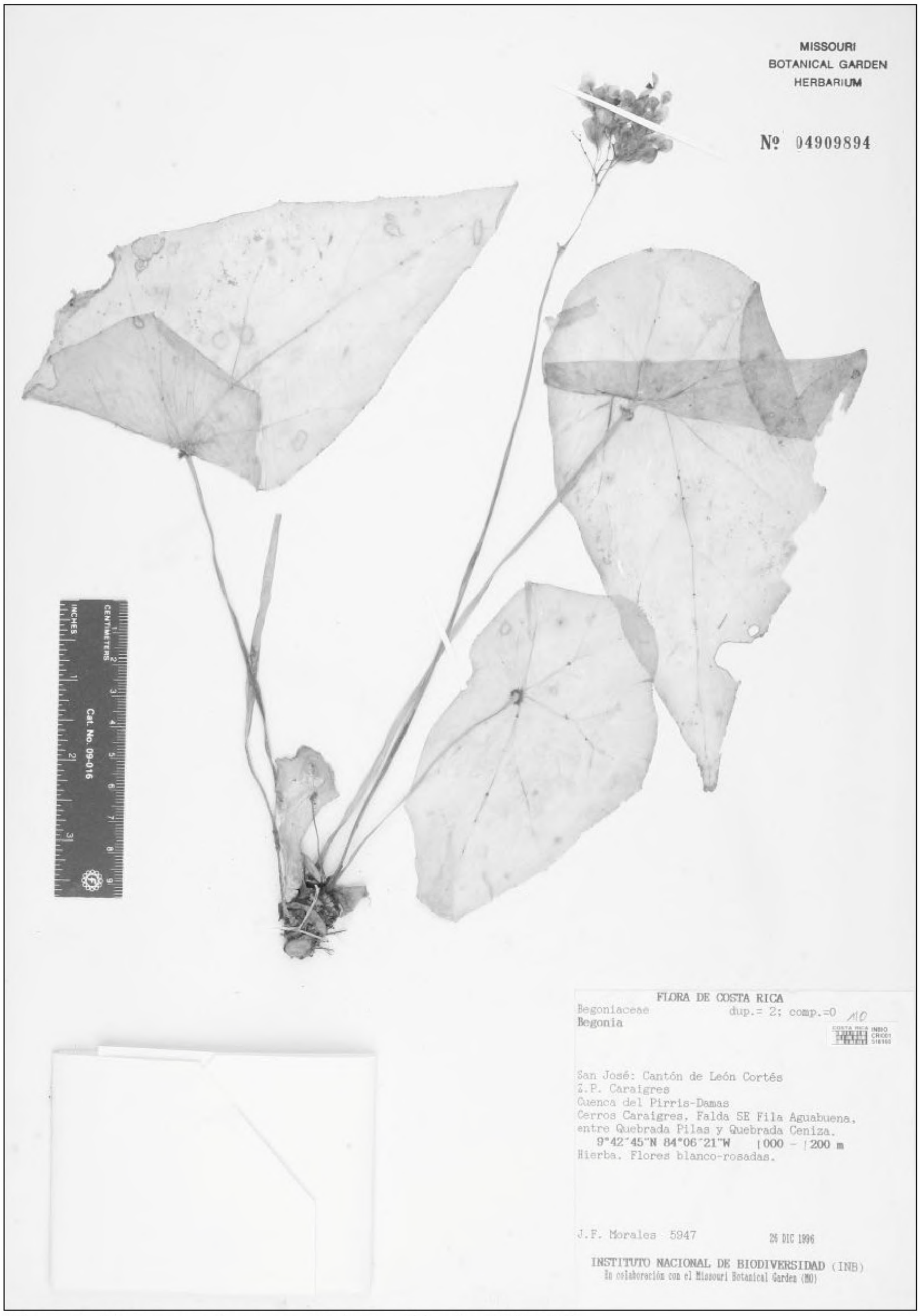

Figure 6. *Begonia aguabuenensis*. **Holotype** (*Morales 5945*, MO).

7. **BEGONIA SUKUTENSIS** Burt-Utley & Utley, sp. nov. **TYPE: COSTA RICA. Limón.** Reserva Indígena Talamanca, Sukut, desembocadura del Río Sukut en el Río Urén, camino al SE hacia Purisqui. 9°24'15"N, 82°58'10 W, 350–550 m, 6 Jul 1989, *B. Hammel, I.A. Chacón, & G. Herrera 17750* (holotype: MO; isotype: USF). Figure 7.

Herbaceous perennials with stout repent rhizomes; internodes 2–3.8 cm long, 7–1.6 cm diam, densely tomentose with whiplash trichomes 2–3 mm. **Stipules** broadly ovate to ovate-triangular, 18–22 x 14–22+ mm, marginally entire, densely villous or the keel only villous; petioles 25.5–43 cm, minutely glandular and tomentose with whiplash trichomes 1–3 mm; leaf blades oblique, asymmetrically broadly elliptic to oblong or obovate, 24–32 x 18–24 cm, basally cordate with lobes occasionally overlapping, apically acuminate, marginally ciliate, finely denticulate, and occasionally dentate at ends of major nerves; glabrous above except villous above the petiole insertion, villous on nerves below but only sparingly so in intercostal regions; 14–15-palmatinerved. **Inflorescences** exceeding the foliage, asymmetrically cymose, many-flowered; peduncles 1–1.2 m, sparingly pilose with trichomes 0.3–2 mm and minutely glandular; lowermost floral bracts unknown, but the upper convex, marginally entire and villous medially. **Staminate flowers** with pedicels 2–4 mm, villous and glandular; sepals 2, transversely elliptic, 2–5 x 3–3.5 mm, glabrous to very sparingly villous and glandular, cystospheres present, white; petals wanting; stamens on a raised torus and occasionally appearing submonadelphous, 64–75; filaments 0.5–0.7 mm, maroon; anthers broadly obovate to oblong, 0.3–0.7 x 0.30.4 mm, connective maroon. **Pistillate flowers** with pedicels 1–4 mm, villous and glandular; sepals 2, broadly transversely elliptic to obovate or suborbicular, 4–6 x 3.5–6 mm, glabrous to sparingly villous and glandular, white, cystospheres present; petals wanting; ovary 2–3 mm, glabrous, cystospheres abundant; styles 3, 0.5–1.2 mm; stigmas bicornute, appearing maroon when dry. **Capsules** with pedicels to 2 mm; bodies often beaked, 4.5–5.5 mm; locule chambers externally appearing suborbicular to broadly ovate, 3–3.5 x 3.5–4 mm; wings 3, unequal, the largest wing asymmetrically ovate, 7–10 x 5–5.5 mm; the other two wings marginiform, lunate to lunate-triangular.

Etymology. *Begonia sukutensis* is named for the region where this species was collected, Sukut, Reserva Indígena Talamanca, desembocadura del Río Sukut en el Río Urén.

Distribution. *Begonia sukutensis* is known only from the type locality between 350–550 m, but certainly it is expected elsewhere in Costa Rica and possibly Panama in the appropriate environments.

Begonia sukutensis stands apart from almost all other Mesoamerican species in sect. *Gireoudia* (Kl.) A. DC. in its very long peduncles, very short pedicels, and very small sepals and capsules. It is also the only species of Mesoamerican *Begonia* that has filaments, anthers, stigmas and styles that appear maroon; in all other species they are yellow (Burt-Utley, pers. obs.). This unique maroon pigmentation also has not been observed in flowers of western South American taxa (Burt-Utley, pers. obs.). The only other taxa in the section in Costa Rica and Panama with sometimes small sepals and submonadelphous stamens like those of *B. sukutensis* are *B. corredorana* C. DC., a suffrutescent species, and the rhizomatous *B. quaternata* Smith & Schubert (Burt-Utley 1985). *Begonia sukutensis* appears most closely related to *B. corredorana* and occurs at similar elevations, but the latter species is found in evergreen forests and cloud forests on Costa Rica's and Panama's Pacific slopes between 20–900 m, while *B. sukutensis* colonizes Costa Rica's Caribbean slopes. Both taxa have similar villous-tomentose pubescence but differ in plant habit (rhizomatous vs. caulescent), stipule form and size, with those of *B. sukutensis* broadly ovate to ovate-triangular 18–22 x 14–22+ mm (vs. lanceolate, 18–25 x 6–8 mm), glabrous adaxial leaf surfaces (vs. hirsute), more numerous leaf blade nerves (14 to 15 vs. 10 to13), elongate peduncles [to 1.2 m vs. (12–)18–36 cm], more numerous stamens [64–75 vs. 16–41], and its smaller large capsule wings [7–10 x 5–6 mm vs. (12–

)14–19(–22) x (7–)9–11 mm]. From *B. quaternata*, *B. sukutensis* is immediately distinguished by its tomentose petioles (vs. squamose) and its dichotomously branching inflorescences, in contrast to the typically 3–6-branched inflorescences characteristic of *B. quaternata*.

Figure 7. *Begonia sukutensis*. Isotype (*Hammel, Chacón, & Herrera 17750*, USF).

8. BEGONIA PANAMENSIS Burt-Utley & Utley, sp. nov. **TYPE. PANAMA. Chiriquí.** Trail between N fork of Río Palo Alto and Cerro Pato Macho, 6 km NE of Boquete, 1800–2200 m, 7 Feb 1986, *M. Grayum 6418* (holotype: MO; isotypes: PMA, USF). Figure 8.

Herbaceous perennials with slender rhizomes; internodes short to occasionally elongate, 0.7–2 (–4.2) cm, 4–9 (–14) mm diam, glabrous to very sparingly villous with stout trichomes to 1 mm. **Stipules** caducous to fugacious, ovate to oblong, 11 x 7 mm, marginally entire, glabrous, only rarely very sparingly villous, keeled; petioles (4.5–)11–35 cm, glandular and sparingly pilose at maturity with fine sericeous villi 1–3(–3.5) mm; leaf blades oblique to transversely elliptic or ovate, (6.5–)9–16.8 x (4–)7.2–11 cm, basally cordate, apically acuminate, marginally eciliate, weakly undulate, glabrous above and sparingly pilose below, especially on major nerves; 10–12-palmatinerved. **Inflorescences** asymmetric, shorter than to exceeding the foliage, ca 8 or fewer-flowered; peduncles (11–)16.5–38 cm, sparingly pilose with trichomes 1–3 mm; bracts caducous, broadly obovate, 17–18 x 20–22 mm, apically retuse, marginally entire, glabrous. **Staminate flowers** with pedicels 23–46 mm, glabrous to very sparingly pilose; sepals often coriaceous when dry, transversely elliptic, 15–21 x 23–30 mm, glabrous to sparingly glandular and pilose proximally; petals wanting; stamens very numerous, in excess of 100; filaments 0.8–3 mm, appearing free or on a slightly raised torus; anthers narrowly oblong to obovate, (1.3–)1.8–2.5 x 0.4–0.7 mm. **Pistillate flowers** with pedicels 10–15 mm, pilose; bracteoles wanting; sepals transversely elliptic, 10–18 x 17–27 mm, glabrous to sparingly glandular or very sparingly pilose; petals wanting; ovaries fleshy, bilocular with bipartite placentae, 11–15 mm, glandular and pilose; styles 3, 4 mm, fused briefly basally; stigmas bicornute. **Capsules** with pedicels 19–27 mm; bodies when dry coriaceous before dehiscence, strongly nutant, weakly to strongly beaked, rarely unbeaked, (15–)17–23 mm; wings 3, unequal, the largest wing oblong, 14–16 x 15–17 mm; the second and third wings lunate-triangular.

Distribution and habitat. *Begonia panamensis* occurs in montane rainforests and cloud forests between 1700 and 2300 m. Although all collections are from Panama, it would not be surprising to find *B. panamensis* in adjacent western Costa Rica.

Begonia panamensis is a striking rhizomatous species with few flowers and very large sepals. It has the characteristic fleshy, bilocular ovaries and nutant capsules that dehisce only after their outer covering has eroded like other species in sect. *Weilbachia* (Burt-Utley & Utley 1999), a section known only from Central America and México. Only two other species in this section are known to occur in Panama, *B. carletonii* Standl. and *B. vestita* C. DC. *Begonia panamensis* is readily distinguished from these taxa by its apetalous staminate and pistillate flowers, large sepals, and very numerous stamens. *Begonia panamensis* is most similar to *B. copeyana*, a Costa Rican endemic, with which it shares its apetalous flowers, a similar but less dense indument, and bicornute stigmas. However, it stands apart from this latter taxon in both vegetative and floral characters, including its glabrous to very sparingly villous internodes, more numerous primary blade veins (10–12 vs. 7–10), more numerous stamens [100+ vs. 24–33(–52)], broader staminate sepals (23–30 mm vs. 10.5–20 mm), larger pistillate sepals (10–18 x 17–27 mm vs. 7.5–8 x 10–12 mm), and larger capsules [(15–)17–23 mm vs. 13–16 mm).

Additional specimens examined. PANAMA. Chiriquí. E slopes of Cerro Pando, 8°55'N x 82°44' W, 15 Oct 1981, *Knapp 1666* (USF); 8 km W of Cerro Pando in vicinity of Las Nubes on trail above stream, 11 Feb 1978, *Utley 5669* (DUKE); Cerro Pate de Macho, ca 5 mi NE of Boquete, on trail to continental divide leading to Finca Serrano, Pacific slopes, 23 Nov 1979, *Croat 48559* (MO, USF); vicinity of Boquete, Cerro Pate de Macho SW slope, 8° 46'N, 82°25'W, 19 June 1987, *Croat 66418* (MO, USF); trail to top of Cerro Pate de Macho, 8°40'N, 82°28'W, *Hoover 557* (MO, USF); end of rd past Palo Alto to Bocas, *Hammel, D'Arcy, & Averett 6506* (MO); SE slopes and summit of Cerro Pato Macho, trail from Río Palo Alto, 4 km NE of Boquete, 27 May 1981, *Sytsma, Knapp, &*

Andersson 4975 (MO); Distr. Bugaba, Santa Clara to Cerro Pando, 28 Feb 1985, *van der Werff & Herrera 7180* (MO, USF).

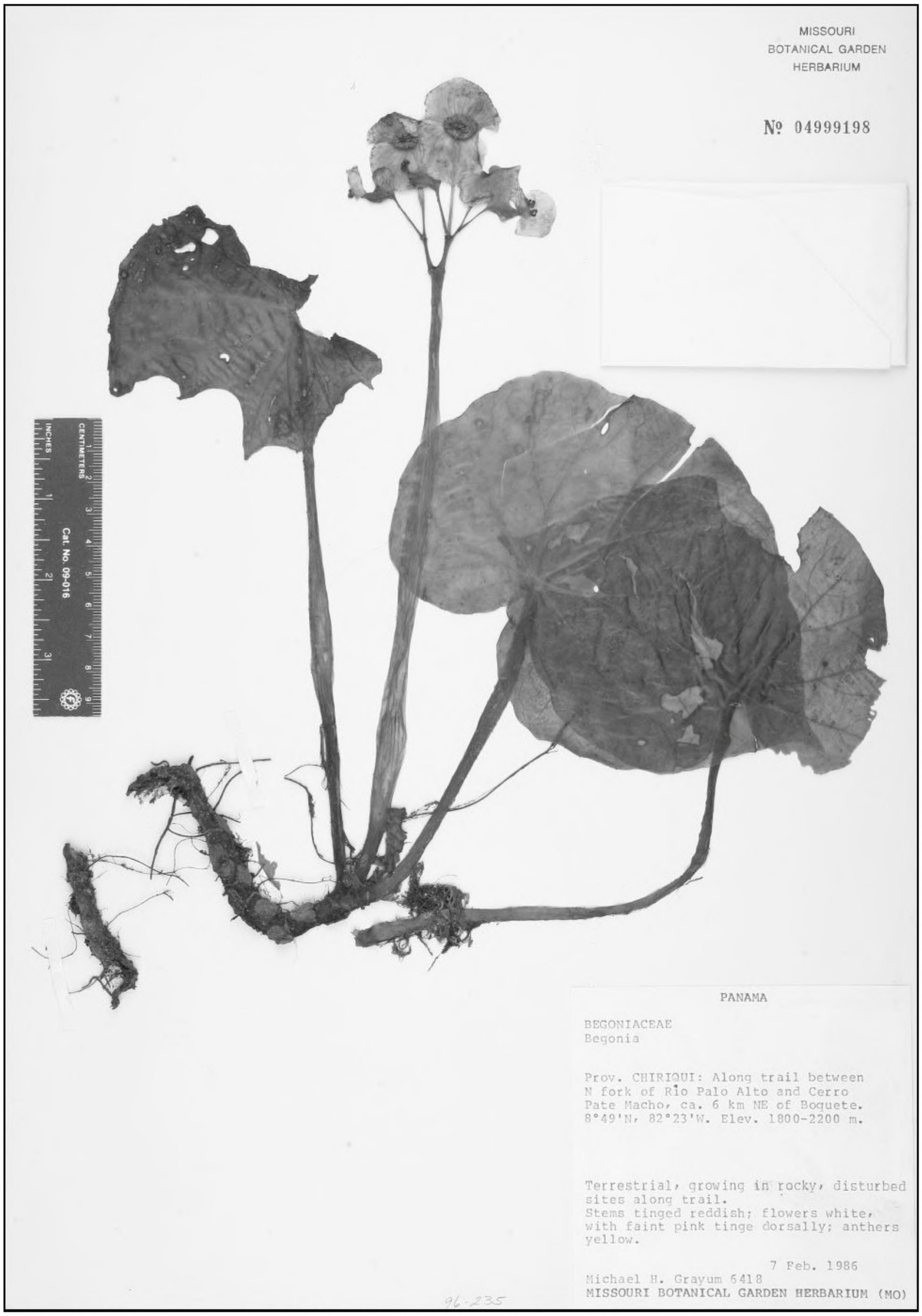

Figure 8. *Begonia panamensis*. Holotype (from *Grayum 6418*, MO).

9. **BEGONIA GRACILIOIDES** Burt-Utley & Utley, sp. nov. **TYPE. GUATEMALA. Sololá.** Volcán San Pedro, 2150 m, 20 Sep 1971, *A. Molina R. & A.R. Molina 26652* (holotype: F; isotype: MICH). Figure 9.

Monoecious herbs presumably with underground tubers; leafy stems erect, freely branching, 0.5–1 m tall; often producing clusters of small bulbils 0.4–1.5 mm diam at the nodes; internodes 3.5–8.5 cm, 3–6.5 mm diam, but the slender branches to 1 mm diam, glabrous to minutely sparingly glandular. **Stipules** persistent, asymmetrically broadly ovate, 5.5–8 x 6–9.5 mm, marginally glandular and ciliate-serrulate, glabrous; petioles (0.6–)2.1–6.5 cm, hirtellous with trichomes to 1 mm; lower leaf blades oblique to occasionally straight, asymmetrically ovate to deltoid, 4.4–10.3 x 3–6 cm, basally cordate, apically acute to acuminate, marginally serrate to doubly serrate or dentate, sparingly ciliate, hirtellous above and below; 6–8-palmatinerved; upper leaf blades asymmetric, much reduced in size. **Inflorescences** borne in the axils of upper leaves and terminating the stem, symmetric, 3–7-flowered; peduncles 2.2–3.8 cm, sparingly minutely glandular; bracts deciduous, hemiorbicular to obovate, (6–)7–8.5 x 4.5–11 mm, marginally glandular-ciliate-denticulate. **Staminate flowers** with pedicels 13 mm, glabrous to minutely glandular; sepals 2, ovate to elliptic, 19–21 x 11–13 mm, apically acute to acuminate, marginally glandular-serrulate to denticulate or crenulate, glabrous; petals 2, obovate to elliptic, 13 x 8 mm distally glandular-crenulate to denticulate with short stalked glandular hairs; stamens numerous; filaments to 2 mm, appearing monadelphous; anthers obovoid to subglobose, inserted at an angle, 0.8–0.9 mm. **Pistillate flowers** at anthesis unknown: ebracteolate; tepals presumably 5, elliptic to narrowly ovate, marginally glandular-serrulate with short stalked glandular hairs, externally glabrous to minutely glandular; ovaries trilocular with bipartite placentae, 7–10 mm, immediately post-anthesis, glabrous; styles 3, to 1 mm, fused basally; stigmas bicornute. **Capsules** with pedicels to 16–18 mm, glabrous to minutely glandular; bodies 17–18 mm; locules externally elliptic, 14–15 x 7–8 mm; wings 3, unequal, the largest wing asymmetrically triangular, 11–12 x 16 mm, the second and third wings asymmetrically lunate to lunate-triangular.

Distribution and habitat. *Begonia gracilioides* is known only from Guatemala, where it occurs on moist banks and in thickets between 1800 and 3000 m. This species might actually be distributed more widely but, because it presumably will die back to its tubers after flowering, will not be a conspicuous component of the vegetation during part of the year.

Begonia gracilioides (sect. *Knesebeckia*) is characterized by its branching, leafy erect stems, bulbils, several-flowered inflorescences, and marginally denticulate to serrulate staminate sepals. Because bulbils have only been observed on tuberous species from México and Central America, their presence in leaf axils of *B. gracilioides* strongly suggests that this species also develops from underground tubers like the Mexican endemic *B. gracilis* H.B.K. (pers. obs.). Three other species known from Central America with bulbils are also tuberous, *B. weberlingii* Irmsch. (El Salvador and Oaxaca, México), *B. biserrata* Lindl. (Guatemala and Honduras), and *B. ignea* (Kl.) A. DC. (Costa Rica) (pers. obs.). Although the type and paratype of *B. gracilioides* were identified previously as *B. gracilis* and the species was illustrated in the Flora of Guatemala (Smith & Schubert 1961), this species differs from *B. gracilis* in several characters including its several-flowered inflorescences. In contrast, those of *B. gracilis* are typically 2-flowered, bearing one staminate and one pistillate flower (Burt-Utley & McVaugh 2001). Moreover, peduncles are longer in *B. gracilioides* than they are in *B. gracilis* (2.2–3.8 vs. 0.5–1.5 cm), while inflorescence bracts are deciduous in *B. gracilioides* but persistent in *B. gracilis*. In *B. gracilioides*, staminate sepals are acute to acuminate and more narrow than those of *B. gracilis* (11–13 mm vs. 15–22 mm) and are conspicuously glandular-ciliate and denticulate, unlike those of *B. gracilis*, which are simply denticulate to crenulate. Capsules of *B. gracilioides* are also smaller than those of *B. gracilis* (17–18 mm vs. 17–25 mm). These species also differ in their distributions with *B. gracilioides* apparently endemic to Guatemala, while *B. gracilis* is

very widely distributed in México and has been collected in central Oaxaca, but it is unknown from Chiapas.

Additional specimens examined. GUATEMALA. Escuintla. Volcán Pacaya, 28 Sep 1972, *Molina & Molina 27652* (F, MICH). **Sololá.** Volcán Tolimán (slopes above San Lucas Tolimán), 13 Jun 1942, *Steyermark 47605* (F).

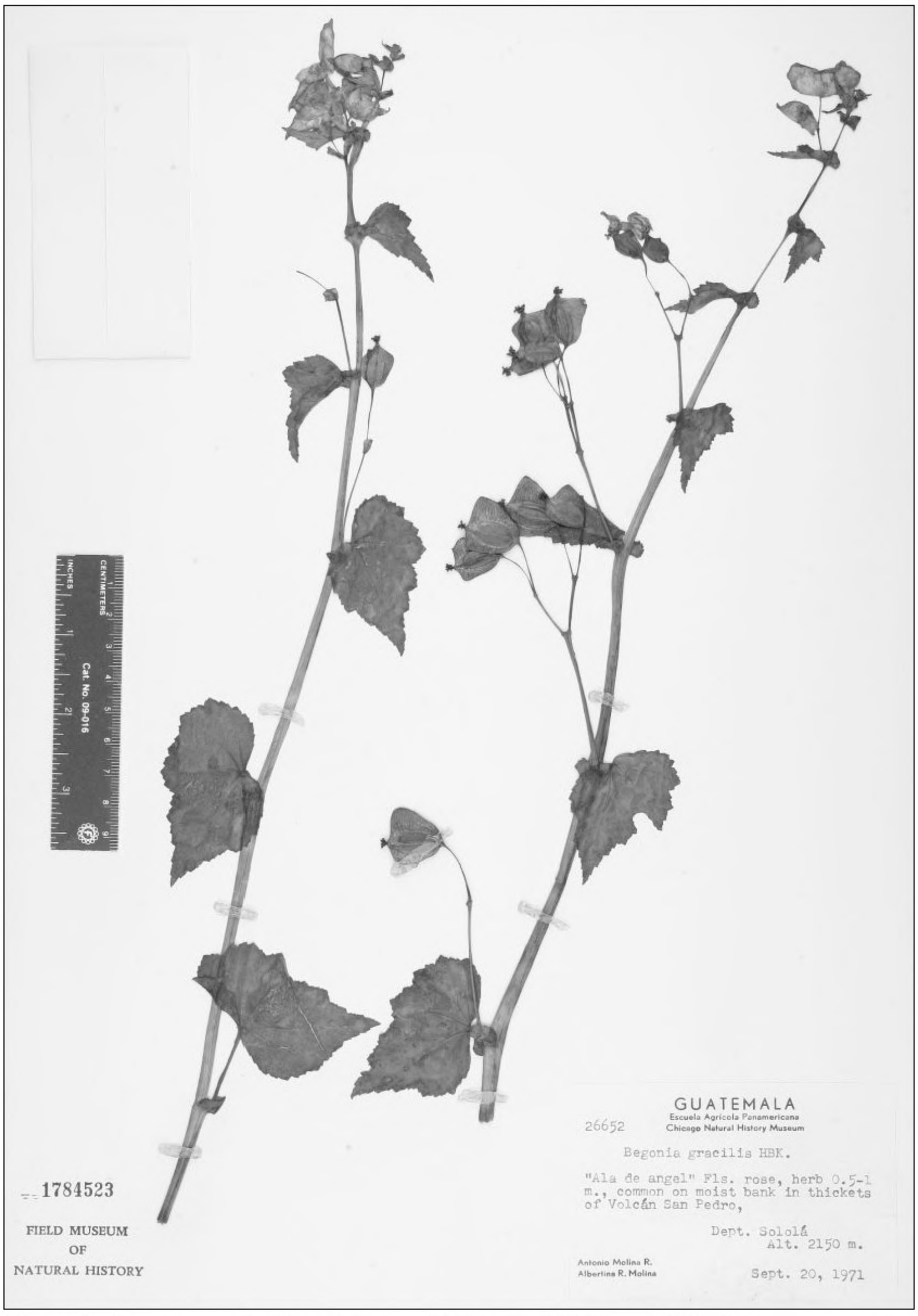

Figure 9. *Begonia gracilioides*. Holotype (*Molina R. & Molina 26652*, F).

10. BEGONIA TENUIS Burt-Utley & Utley, sp. nov. **TYPE. MÉXICO. Chiapas**. Cerro del Boquerón, Aug 1913, *C.A. Purpus 6937* (holotype: NY). Figure 10.

Herbs presumably developing from underground tubers annually, leafy stems erect to sprawling, branching weakly distally, 17–40+ cm tall; often producing clusters of small bulbils to 1 mm diam at the nodes; internodes 2.5–7.5 cm, 1–4 mm diam, hirtellous with short villi 0.4–1 mm. **Stipules** persistent, ascending to spreading, asymmetrically hemiorbicular to broadly ovate, 2–6 x 3.5–7 mm, marginally ciliate-serrulate to ciliate denticulate, sparingly hirtellous; petioles 1.1–4.7 cm, hirtellous with short villous trichomes 0.3–0.5 mm; lower leaf blades asymmetric, obliquely narrowly ovate, 3.3–11 x 1.5–4.5 cm, basally very shallowly cordate to appearing almost cuneate, apically attenuate-acuminate, hirtellous throughout above and beneath but trichomes most dense on major nerves below; 7–8-palmatinerved; upper blades reduced in size. **Inflorescences** borne in axils of reduced upper leaves and terminal, 1–2 or more-flowered; peduncles 1.1–3.0 cm, sparingly hirtellous; bracts obovate to suborbicular, 2–3 x 3–4 mm, marginally ciliate-denticulate to ciliate serrulate, glabrous to very sparingly hirtellous. **Staminate flowers** with pedicels 10 mm; sepals ovate, 12–14 x 8–10 mm, marginally ciliate-denticulate to ciliate-serrulate, apparently glabrous; petals 2, elliptic, 12.5–15 x 5.5–7 mm; stamens very numerous, borne on a stout torus, anthers to 1 mm. **Pistillate flowers** with pedicels to 14–18 mm; bracteoles wanting, tepals 5, variable in shape, elliptic to ovate or obovate, 7.5–13 x 5–8 mm, marginally the outer 3 ciliate-denticulate to ciliate-serrulate, glabrous; ovary 8–10 mm, presumably trilocular with bipartite placentae, glabrous; styles 3, 1–1.3 mm fused briefly basally; stigmas bicornute. **Capsules** when immature with pedicels to 20 mm; bodies to 1.5 cm; wings 3, apparently subequal.

Etymology. The specific epithet, *tenuis*, refers to the slender stems of this species.

Distribution and habitat. *Begonia tenuis* is known only from eastern Chiapas in México, between 1000–2000 m, but this species should occur in adjacent parts of Guatemala and possibly El Salvador. Like *B. gracilioides*, this species would be expected to die back to its tubers after flowering and therefore may not be evident many months of the year.

Begonia tenuis (sect. *Knesebeckia*) is characterized by its slender hirtellous stems, bulbils in its leaf axils, hemiorbicular to broadly ovate stipules and ciliate-denticulate to ciliate-serrulate staminate sepals. Like *B. gracilioides*, the presence of bulbils strongly suggests that this species also develops from underground tubers, since all species that produce bulbils within México and the region delimited by the Flora Mesoamericana also are tuberous (pers. obs.). In Arthur Houghton's thesis on the Begoniaceae of North America (Houghton 1924), *B. tenuis* was described as *B. gracilis* var. *chiapensis* Houghton, but it was never published. This species is most similar to the tuberous species *B. dealbata* Liebm. (Oaxaca, México, and Guerrero) in its slender habit, and *B. gracilis*, also a Mexican endemic widely distributed through northern, central, and western México. *Begonia tenuis* differs from both *B. dealbata* and *B. gracilis* in its hemiorbicular to broadly ovate stipules, in contrast to the unusual basally cuneate and distally lobed, foliaceous stipules characteristic *B. dealbata* and the ovate to triangular stipules of *B. gracilis*. Ovaries of *B. tenuis* are generally much larger than those of *B. dealbata* (8–10 mm vs. 3.5–7 mm) and smaller than those of *B. gracilis* (8–10 mm vs. 10– 21 mm), while *B. tenuis* has subequal capsule wings, unlike the unequal capsule wings of both *B. gracilis* and *B. dealbata* (pers. obs.).

Additional specimens examined. MÉXICO. Chiapas. Volcán Tacaná, Aug 1938, *Matuda 6039* (LL, MEXU).

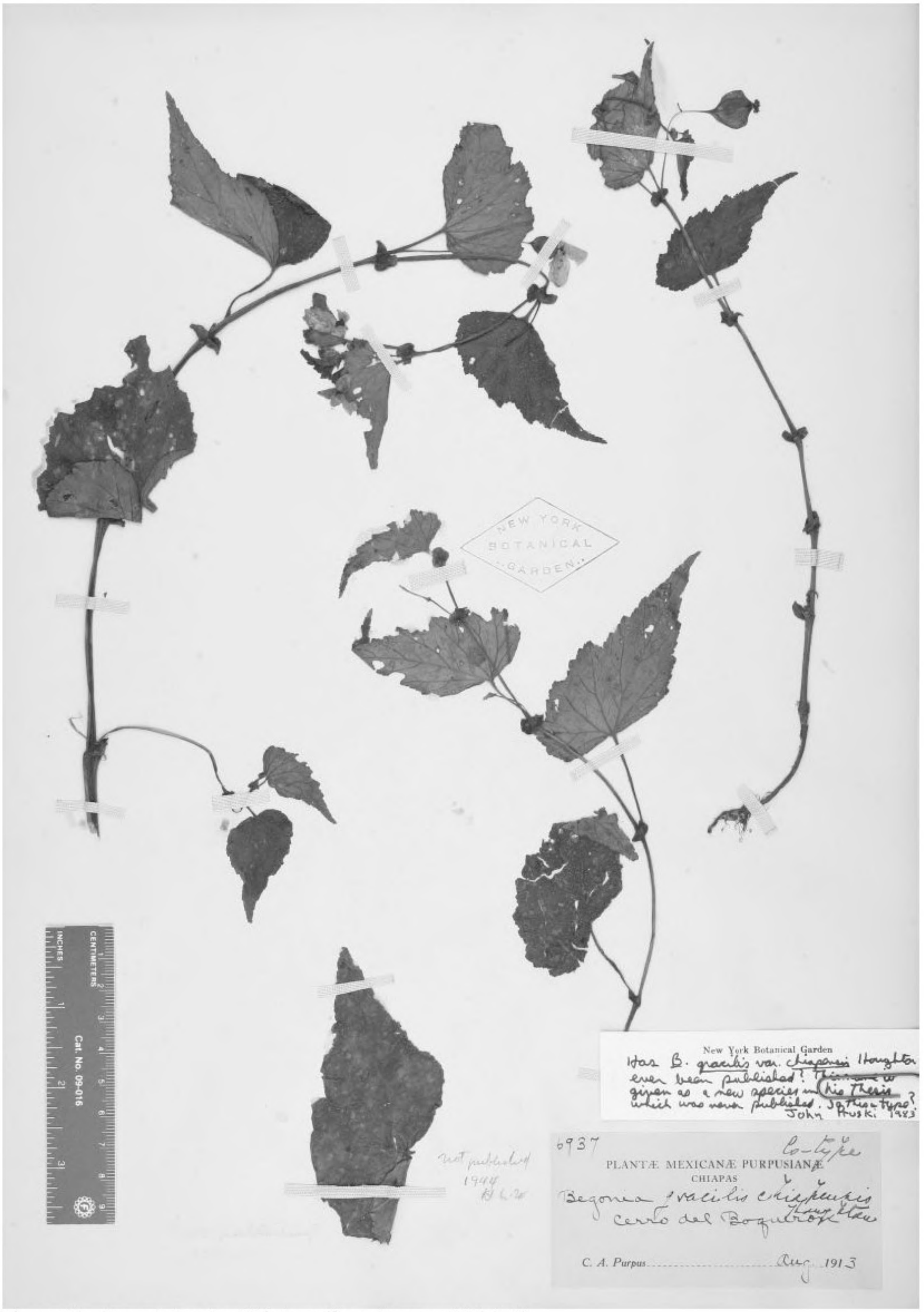

Figure 10. *Begonia tenuis*. **Holotype (from** *Purpus 6937*, **NY).**

Taxonomic Notes

BEGONIA MILITARIS L.B. Sm. & B.G. Schub., Contr. Gray Herb. 154: 24, fig. *2*. 1945. **TYPE. GUATEMALA. Alta Verapaz.** Chamá, 270 m, 15 May 1920, *H. Johnson 178* (holotype: US!; isotype: F!).

Begonia sciadophora L.B. Sm. & B.G. Schub., Contr. Gray Herb. 161: 28. 1946. **TYPE. GUATEMALA. Alta Verapaz.** Dense wet limestone forest near Chirriacté on Petén Hwy, ca 900 m, 9 Apr 1941. *P. Standley 91967* (holotype: F!).

Begonia militaris is unique among Mesoamerican *Begonia* in having 5-tepaled pistillate flowers with bilocular ovaries. Bracteole form, ovary shape, and the species bipartite placentae were described, and the illustration in Plate II (Smith & Schubert 1945) is clearly of a nutant capsule; however, only bilocular ovaries and nutant capsules without bracteoles or bracteole scars were observed on the specimens examined. These characters together with its creeping rhizomatous habit, pilose petioles, and peltate leaves easily distinguish *B. militaris* from all other Mesoamerican *Begonia* except *B. calderonii* Standl. From *B. calderonii*, *B. militaris* is readily distinguished by its staminate flowers with two sepals and two petals (vs. petals wanting) and pistillate flowers with five tepals (vs. two sepals and no petals). Within México and Central America, other species with bilocular ovaries and nutant capsules have pistillate flowers with two sepals and 0–1 petals, which is characteristic of sect. *Weilbachia* (Burt-Utley & Utley 1999). The affiliation of *B. militaris* with either a section or other species remains unclear. *Begonia sciadophora* is indistinguishable from *B. militaris* in both vegetative and floral characters, including its 5-tepaled pistillate flowers with bilocular ovaries and is synonymized here with *B. militaris*.

Additional specimens examined. GUATEMALA. Alta Verapaz. Chapultepec Farm, 62 km from Cobán on Sebol road, 22 May 1964, *Contreras 4763* (DS, US); near Chirriacté on Petén Hwy, 900 m, 9 Apr 1941, *Standley 91953* (F).

BEGONIA LUDICRA A. DC., Ann. Sci Nat. Bot. IV, 11: 133. 1859. **LECTOTYPE** (designated here): **MÉXICO. Veracruz.** Cordillera, marais de xalapa, 4000 ft, Jun 1840, *Galeotti 189* (G!; isolectotypes: BR!, K!, P!).

Begonia liebmannii A. DC., Prodr. 15: 345. 1864. **LECTOTYPE** (designated here): **MÉXICO. Oaxaca.** Tonaguia, Aug 1842, *Liebmann s.n.* (B!; isolectotypes: C[2]!).

Begonia ludicra was described by A. DC (1859) without the benefit of capsules and included in sect. *Gireoudia*, a section with typically trilocular ovaries. In the Flora of Guatemala (Smith & Schubert 1961), *B. ludicra* was also characterized as having "3-celled" ovaries and nutant to very sharply reflexed capsules. Examination of available collections of *B. ludicra* establish that the pistillate flowers have bilocular, nutant, or reflexed ovaries and capsules that must have their outer coverings erode before dehiscence. These traits are consistent with species in sect. *Weilbachia* (Burt-Utley & Utley 1999) and, with the exception of *B. militaris*, have not been observed in other taxa in from México and Central America.

Begonia ludicra has been considered variable in vegetative and floral characters and thought to be distributed from southern México to Guatemala and Panama (Smith & Schubert 1961). However, its description and inclusion in the Flora of Guatemala were based primarily on a vegetatively similar species, *B. purpusii* Ziesenh. Specimens of this latter taxon consistently were misidentified as *B. ludicra*, a species with similar bilocular ovaries and capsules. *Begonia ludicra* is readily distinguished from *B. purpusii* in a number of characters, including its habit and staminate and pistillate flowers. *Begonia ludicra* has rhizomes with short to elongate internodes that root at the nodes and are repent or attached to an upright substrate, where they can form dense masses or mats of

individuals, while *B. purpusii* has elongate stems that may be upright to inclined. *Begonia ludicra* is also distinguished from *B. purpusii* by its staminate flowers with an inner perianth of two petals and pistillate flowers with one petal. In contrast, staminate and pistillate flowers of *B. purpusii* have two sepals and no petals. *Begonia ludicra* is endemic to México, distributed from the states of Veracruz and adjacent Puebla to the wet Caribbean slopes of the Sierra Madre in central Oaxaca, while *B. purpusii* occurs in eastern Chiapas and Guatemala.

Representative specimens examined. MÉXICO. Veracruz. Mpio. Huatusco, Ventura, 3 km NE de Huatusco, 1300 m, 31 May 1979, *Avendaño & Benavides M. 301* (F); Mpio. Yecuatla, Lomas de Santa Rita, 3 Jul 1971, *Ventura 3621* (MEXU, MICH); near Jalapa, *Schiede 733–734* (B); Jalapa, Jun 1838, *Linden 31* (K, MICH). **Puebla.** Cascada de Oligui, entre Teziutlán y Tlapacoyan, 1550 m, 2 Jun 1968, *García Saucedo 76* (MEXU). **Oaxaca.** Mpio. Sta. María Chilchotla, NE de Agua de Gancho, Agencia Municipal María Luisa (8 km del Puente de Fierro, por la terracería a Sta. María Chilchotla, 18°12'21.6" N, 96°49'28.4" W, 1474 m, 8 Jun 2001, *Munn-Estrada & Juárez 1283* (USF); 6 mi S of Puente Nacional on MEX 175 from Tuxtepec to Oaxaca, 2200–2300 ft, 1 Jun 1987, *Utley & Utley 7878* (MEXU, USF); 15.1 mi S of Puente at Valle Nacional or 2 mi N of Vista Hermosa, 4600 ft., 2 Jun 1987, *Utley & Utley 7882* (USF); 3.1 mi N of La Esperanza or 16.1 mi S of bridge at Valle Nacional on Mex 175, 4300 ft, 28 May 1992, *Utley & Utley 8777* (MEXU, USF), Dto. Ixtlán, Puerto San Antonio entre Metates & La Esperanza, 1250 m, 4 Aug 1985 *García M., Lorence, & Allen 1835* (MEXU); 5 km N de Vista Hermosa, km 175 carr. Oaxaca-Tuxtepec, 1260 m, 14 Apr 1982, *Torres C. & Lorence 295* (MEXU).

BEGONIA PUSTULATA Liebm., Vid. Meddel. Dansk Naturh. Foren. Kjöbenhavn 1852: 6. 1853. **LECTOTYPE** (designated here): **MÉXICO. Oaxaca.** Lacoba, Distr. Chinantla, *Liebmann 202* (C!; isolectotypes: B!, C[2]!).

Begonia pustulata is endemic to México, occurring in eastern Veracruz and the lower northern slopes of the Sierra Madre in Oaxaca. Its inclusion in the Flora of Guatemala was based on collections of *B. imperialis* Lem. that were misidentified as *B. pustulata* and illustrated there (Smith & Schubert 1961). This illustration, identified as *B. pustulata*, was used most recently in a synopsis of sect. *Weilbachia* (Doorenbos et al. 1998). *Begonia imperialis* is more widely distributed than *B. pustulata*, ranging from the Isthmus of Tehuantepec to Guatemala between 100 to 1130 m. Although both species have similar bilocular ovaries, they are readily distinguished from each other vegetatively and when in flower. *Begonia pustulata* has larger leaf blades [(7.7–)14–23.3 x (4.6–)8–16.7 cm vs. 5–14(–16) x 3.5–8(–10.6) cm], generally more nerves [(9–)12–14 vs. (8–)9–10 (–11)], and longer peduncles [(8.5–)15–39 cm vs. (4–)6.2–13.5(–17.3)] than *B. imperialis*. Floral characters also separate these species: *B. pustulata* has both staminate and pistillate flowers with two sepals and an inner perianth of petals, while flowers of *B. imperialis* lack petals. Although petals occasionally may abscise from flowers of *B. pustulata*, all specimens examined and populations visited in Oaxaca had flowers with an inner perianth series (Burt-Utley, pers. obs.).

Begonia faustinoi Burt-Utley & Utley from Chiapas, México also has been confused with *B. pustulata*, with which it shares certain vegetative and floral characters, including a similar villous indument, staminate and pistillate flowers with both sepals and petals, as well as nutant, bilocular ovaries and capsules. *Begonia pustulata* can be distinguished from *B. faustinoi* by its consistently pustulate or bullate upper leaf surfaces, unlike the even upper surfaces of *B. faustinoi*, as well as its more numerous nerves [(9–)11–14 vs. (8–)9–10(–11)] and longer peduncles [(8.5–)15–39 vs. (4–)6.2–13.5(–15.5) cm] (Burt-Utley & Utley 1999).

Representative specimens examined. **MÉXICO. Veracruz.** Mpio. Catemaco, Dos Amantes entre Catemaco y Sontecomapan, 400 m, 17 Jun 1972, *Beaman & Alvarez del Castillo 6199* (F,

XAL). **Oaxaca.** 6 mi above Valle Nacional on Hwy 175 to Oaxaca, 23 Aug 1977, *Croat 43924* (MO); 17°30'N x 86 ° 30' W, 100 m, 2 Jul 1981, *Hahn 626* (USF); 5.7 mi S of bridge at Valle Nacional on Mex 175 from Tuxtepec to Oaxaca, 2100 ft, 5 Aug 1987, *Utley & Utley 8042* (MEXU, USF); 5.8 mi S of bridge at Valle Nacional on Mex 175, 2300 ft, 28 May 1992, *Utley & Utley 8775* (MEXU, USF); 6 mi above Valle Nacional on Hwy 175 to Oaxaca, 660 m, 23 Aug 1977, *Croat 43924* (MO); 6.2 mi S of Valle Nacional on Mex 175, 2400 ft, 30 Dec 1985, *Utley & Utley 7525* (USF); 6.2 mi S of Valle Nacional on Mex 175, 2400 ft, 23 Dec 1986, *Utley & Utley 7649* (MEXU, USF); 6.8 mi S of bridge at Valle Nacional on Mex 175 from Tuxtepec to Oaxaca, 2600 ft, 1 Jun 1987, *Utley & Utley 7873* (MEXU, USF); 12 mi S of bridge at Valle Nacional on Mex 175 from Tuxtepec to Oaxaca, 100–200 m N of km 68 marker, 3200 ft, 5 Aug 1987, *Utley & Utley 8038* (MEXU, USF); 4.5 mi N of Vista Hermosa on Mex 175, 3600 ft, 12 July 1982, *Utley & Utley 7046* (USF); near Santiago Zacatepec, 1500 m, 24 May 1939, *Schultes 493* (MEXU).

ACKNOWLEDGEMENTS

Field work was made possible by grants from the Standley Smith Horticultural Trust and the American Philosophical Society. We are grateful to Dr. Gerrit Davidse for locating additional *Begonia* specimens for us, Dr. Carmen Ulloa for providing essential literature, and Dr. Richard Wunderlin and Dr. Bruce Hansen for their continued support of our research. We thank Mr. Alan Franck for the digital images of the type specimens, and we especially thank the curators of the following herbaria for the loan of specimens or use of facilities that made this research possible: B, BM, BR, C, CAS, CR, F, GH, K, LL, MEXU, MICH, MO, NY, P, US, USF, and XAL.

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